

PACIFIC ENVIRONMENT



# GREEN OPPORTUNITY

**How California Can Reduce Power Plant Emissions,  
Protect the Marine Environment, and Save Money**



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## **How California Can Reduce Power Plant Emissions, Protect the Marine Environment, and Save Money**

By Robert Freehling and Suzanne Doering

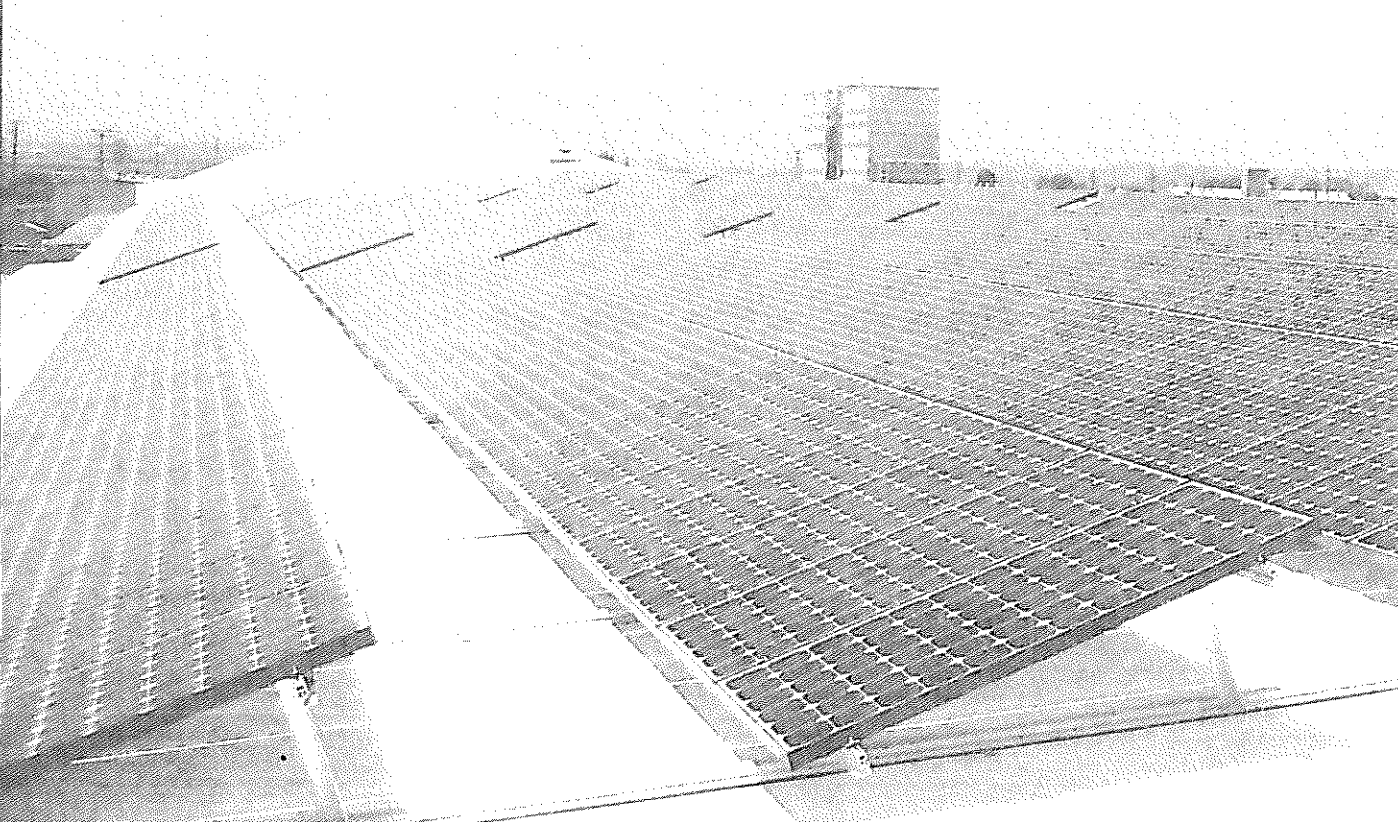
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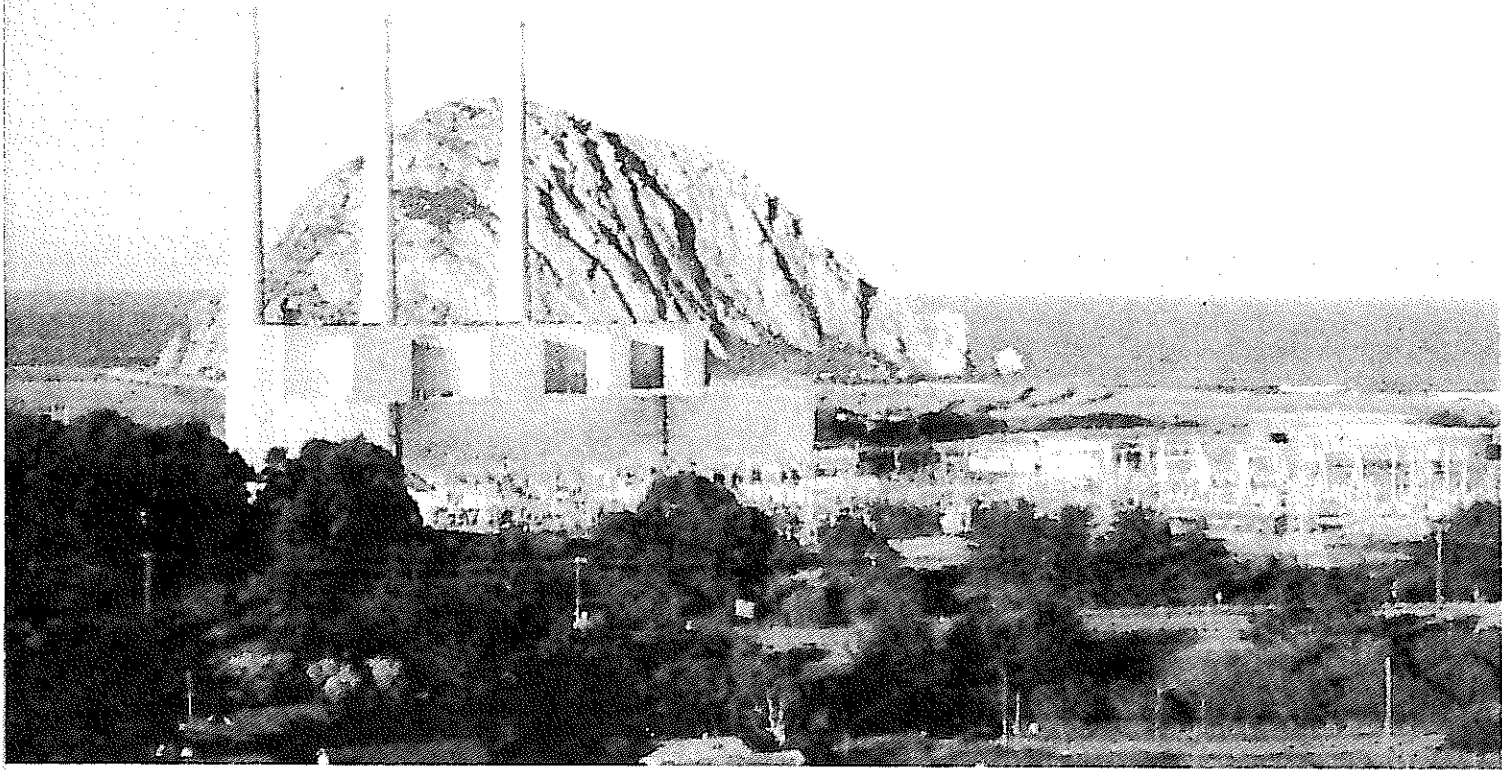
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## Executive Summary

The State of California is currently considering ways to phase out natural gas power plants that use 'once-through cooling' (OTC) technology. This outdated method of power plant cooling uses seawater taken directly from the ocean or from estuaries. In the process, OTC kills billions of fish, larvae and marine mammals each year in California. The phase out, planned for 17 coastal natural gas power plants, presents an opportunity for California to replace the lost power generation with clean generation. In addition to the impacts on marine life, most of these power plants are decades old, are inefficient in their operation, and emit significant amounts of greenhouse gases.

This report provides a cost-benefit analysis of two different scenarios for OTC power plant replacement. The first scenario, the “fossil replacement scenario,” examines the costs of repowering the existing power plant generators with new natural gas power plant technology that does not use OTC. The second scenario, the “green energy replacement scenario,” examines replacement with clean energy, in particular solar power and energy efficiency.

Renewable technologies are often characterized as more expensive than fossil fuels. However, such characterizations usually fail to include costs other than the direct costs of energy facilities and fuel. In this analysis, we have included externalized costs, including those to the marine habitat, to public health, and to the climate. When these are factored

into the cost-benefit analysis, our calculations conclude that the green energy replacement scenario is far more cost effective than the fossil replacement scenario.

This report demonstrates that California can and should retire OTC natural gas power plants. Replacing OTC power plants with renewable energy and efficiency will dramatically reduce externalized costs, including damages to marine life, public health, and the global climate. By meeting stated renewable energy and efficiency goals, California can retire OTC natural gas power plants at a cost less than half of the cost of building new natural gas power plants. California’s policy makers should move quickly and expeditiously to replace OTC natural gas power plants with green energy.

## Key Findings

- California’s 17 aging once through cooling (OTC) natural gas power plants kill billions of fish, larvae and marine mammals every year, contribute to climate change, and cause adverse impacts to human health.
- Most of the aging natural gas power plants are primarily used during peak demand times, usually hot summer afternoons when air conditioning is being used. They are responsible for only 4% of California’s electricity supply, but provide a quarter of California’s peak power demand of 60,000 megawatts.
- There has been a rapid build-up over the past decade of over 16,000 megawatts in new natural gas power plants around the state, dramatically increasing California’s natural gas generation capacity to over 40,000 megawatts.
- By meeting the state’s goal of 33 percent renewable energy by 2020 and required efficiency measures, OTC natural gas power plants can be reduced or eliminated without building any new fossil fuel plants.
- Peak load can be served by solar power, which is most productive on sunny, warm days when electricity demand is high, as well as by efficiency measures such as better insulation and windows, more efficient air conditioners, light colored roofing, and shade trees — all intended to keep buildings cool by using less energy.
- Continuing and expanding interruptible power programs, regulating usage, and real-time pricing can also significantly reduce peak demand. In addition, energy storage technologies can shape wind and other renewable energy sources to meet peak power demand.
- Replacing old power plants with new fossil fuel power plants would result in a cost of energy for the new plants of approximately 31 to 39 cents per kilowatt-hour, when external costs are included.

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Excessive commitment to peakers may drive out lower cost, more environmentally friendly, and economically efficient solutions. The proper planning decision under these conditions is ... to explore the options further.

*2002–2012 Electricity Outlook Report,  
California Energy Commission,  
February 2002.*

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- The cost of the Green Energy Replacement scenario, using solar power, ranges from 22 to 29 cents per kilowatt-hour.
- If efficiency savings are included in the portfolio accounting, the average cost of green electricity goes down to about 17 to 21 cents per kilowatt-hour, assuming that the cost of efficiency is zero. In fact, the state's efficiency program is forecast to yield a net savings, which reduces the cost of the Green Energy Replacement scenario even further.
- The proposed Green Energy Replacement Scenario eliminates the prime externalities: damages to marine life, public health, and the global climate. Thus, the full cost of the Green Energy Scenario may be less than half that of new natural gas power plants.
- All the aging natural gas OTC plants should be retired on a schedule consistent with the rate at which renewables and efficiency can be brought on line, so that the state is not bound by long-term commitments to new natural gas plants. Coordinating the retirement of aging plants with the deployment of green energy supplies would allow the state to meet environmental commitments while assuring electric system reliability.